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ABSTRACT

Trends in the achievement gap between black and white students on Delaware state assessments were studied for 1993 to 2001 for reading and mathematics for grades 3, 5, 8, and 10, and patterns of academic achievement toward the standards were studied for black and white students from grades 3 to grade 5 and from grade 8 to grade 10 in reading and mathematics. Sample 1 included about 2,500 black students and 5,000 white students per grade for every year, and sample 2 included two groups of students with matched records across grades. The Delaware state assessments considered were the Interim Assessment Program and the Delaware Student Testing Program. Analyses included descriptive statistics, time series analysis, the log-odds ratio, and other data analyses of trends. Effect sizes show that, on average, white students scored about 70% to 90% of one standard deviation higher than black students in reading and mathematics on norm-referenced tests across the four grades, with the gap slightly greater in mathematics. For norm-referenced tests, three results of the time-series analysis suggested that the achievement gap between black and white students remained the same in grade 3, declined slightly in grades 5 and 8, and increased in grade 10 for reading. In mathematics, the gap remained similar in grades 3 and 10 and slightly declines in grades 5 and 8. With reference to standards-based assessment, the results of the time-series analysis suggest an overall rising line of the achievement gap for all grades since 1993. The gap in mathematics widened in mathematics for grades 3 and 5, but remained nearly the same for grades 8 and 10. The reading gap widened slightly overall, but no overall changes in the achievement gap between black and white students were suggested for the matched record sample of students. (Contains 14 tables and 32 references.) (SLD)

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Examining Achievement Gap between Black and White Students - A Longitudinal Study

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Examining Achievement Gap between Black and White Students – A Longitudinal Study

Background

The *No Child Left Behind Act of 2001* that President Bush signed into law recently is the most sweeping reform of the Elementary and Secondary Education Act (ESEA). It redefines the federal role in K-12 education and will help close the achievement gap between disadvantaged and minority students and their peers (No Child Left Behind Act of 2001: Reauthorization of the Elementary and Secondary Education Act, 2002). Since 1960s, researchers have documented the achievement gap between black and white students in performance on standardized tests (Hoff, 2000). The span appeared to be narrowing throughout the 1980s, but it has begun to widen again on the National Assessment of Educational Progress (NAEP) and other measures since then. Barton (2001) concluded in the report to the National Education Goals Panel that the achievement gap in reading and mathematics between white and minority students (black and Hispanic combined) did not decline at the elementary and middle school levels during 1990s.

In 1999, the National Task Force on Minority High Achievement Report called that narrowing the achievement gap between black and white students is becoming urgent and a priority in states and districts nationwide. With the increased use of performance assessment in statewide testing programs and high-stakes accountability decisions (e.g., retention, promotion, summer school, and graduation), closing the achievement gap becomes one of public education's most pressing concerns. Recently, new studies spotlight racial gap in test scores for statewide achievements in Delaware (Zhang, 2001), Louisiana (Chou, 2001), Massachusetts (Brennan, 2001), Michigan (Viadero, 2001), Ohio (Ohlemacher, 2001), and Texas (Hill, 2000; Miller, 2001). The patterns and trend have been no different across states that the achievement gap between black and white students is wide, pervasive, and persistent. In the initial analyses, Zhang (2001) investigated the black-white gap on the norm-referenced test and the standard-based assessment for grades 3, 5, 8, and 10 in reading, mathematics, and writing across years. This study focused on the patterns of the achievement gap by item format, family income, and gender within each racial/ethnic group, across the racial/ethnic groups, and comparing high-achieving and low-achieving student performance at the top and bottom quartiles of test scores. The preliminary findings suggested that (1) the black-white gap in mathematics was the largest, followed by reading and writing; (2) the achievement gap became wider in the top and the bottom quartiles; (3) black students performed better in developing their responses than selecting answers from provided choices; (4) Within the racial/ethnic group, black female students consistently scored higher than black male students across grades and test. Consequently, the achievement gap between black and white male students was larger than between black and white female students in reading and mathematics, but smaller in writing.

Educational researchers (Hedges, 1999; Slater, 1999; Hill, 2000; Holland, 2001) called for cautions in using test scores for studying the achievement gap in order to avoid misleading results and inappropriate interpretations of the results. However, few studies can be found in the educational research literature focus on methodology of analyzing the achievement gap data. The most well known method for examining differences in test scores between genders, racial/ethnic groups is effect size (Cohen, 1988). Cohen has provided guidelines for the interpretation of effect sizes: small $d = .20$ (of a standard deviation), medium $d = .50$ (of a standard deviation), and large $d = .80$ (of a standard deviation). The results of a Monte Carlo experiment showed empirically that there is considerable variability of effect-size measure and that the extent of such variability is influenced by sample size (Fan, 2001). Holland (2001) raised the question in his study titled "How big is big when it comes to gaps in scores?" He argued that Cohen's rules of thumb are obviously subjective and may be suitable to some settings, but not be suitable to the others. Using NAEP data, Holland illustrated that the random differences are much bigger than Cohen's rules. Holland also pointed out that the meaningful comparison of the percentage of students at each proficiency level depending on where one starts. Hill (2000) re-calculated the white and minority gaps on the Texas statewide assessment using the log-odds ratio. He transferred the percentage of students meeting the standard to an interval scale and found a completely different picture from the newspaper report on minority groups have narrowed the gap. Hill found that the change in achievement gap between black and white students would have been zero and the gap between white and Hispanic students actually would have increased a trivial amount.

In the educational area, the overall trends of student performance over time are usually analyzed using a series of data or longitudinal data rather than simple year-to-year comparisons. Time series analysis provides a better understanding of the change in a variable over time relative to the value of the variable during a specific based period. The 1996 NAEP Long-Term Trend Reading Assessment analyzed a series scores for 'linear' and 'quadratic' trends between black and white students during 1972 to 1996. The results show that the difference between the average scale scores for the racial/ethnic groups declined significantly for both 9- and 17-year-olds, but not for 13-year-olders. The differences in performance for all three age groups demonstrate a negative linear trend, that is, a relatively straight-line decline, due to improving scores for black students. A recent study using time-series regression analyses for the NAEP longitudinal data indicates a significant quadratic trend (downward slope followed by upward slope or leveling off) of the black-white performance gap for all age groups in mathematics and for ages 9 and 13 in reading. The turning point in the black-white gap trend occurred in the late 1980s and early 1990s (Lee, 2002).

Design of the Study

1. Purposes of the Study

Based on the initial analyses, the current study targeted (1) the trend of the achievement gap between black and white students on the Delaware statewide assessments during

1993 – 2001 in reading and mathematics for grades 3, 5, 8, and 10 and (2) the patterns of academic achievement toward the standards for black and white students from grade 3 to grade 5 and from grade 8 to grade 10 in reading and mathematics.

2. Samples of Students

Two samples of students were used in this study for analyses. Sample-I included about 2,500 black students and 5,000 white students per grade every year from 1993 through 1995 and from 1998 through 2001. Those students participated in the Delaware statewide assessments and received a valid score of a given test. Sample-II included two groups of students with matched records across grades. In Delaware, every public school student has a unique ID number that allows researchers to track student progress over time for longitudinal studies. Matched Sample 1 consisted of students who attended grade 3 in 1998 and grade 5 in 2000; Matched Sample 2 consisted of students who attended grade 8 in 1998 and grade 10 in 2000. Those students participated in the 1998 and 2000 statewide assessments and received a valid score of a given test.

3. Delaware Statewide Assessments

3a. Interim Assessment Program (IAP)

In the early stage of Educational Reform initiative, Delaware experienced a transition from using all multiple-choice, standardized, shelf tests to measuring student achievement against a set of academic expectations in the statewide assessment program. In 1993, performance assessments, such as constructed-response items and direct writing prompts, were used for the first time in the statewide testing called Interim Assessment Program (IAP). Student performance was reported in one of three proficiency levels: Meets or Exceeds the Standard, Approaches the Standard, or Considerably bvelow the Standard.

During the same period of 1993-1995, Delaware also administered a norm-referenced test in reading and mathematics, in addition to the performance assessment. The Survey Batteries of the Iowa Tests of Basic Skills (ITBS Form K) were given to students in grades 3, 5, and 8 and the Survey batteries of the Tests of Achievement and Proficiency (TAP Form K) were given to students in grade 10. In 1996 and 1997, the state dropped the reading and mathematics assessments and kept the writing assessment only.

3b. Delaware Student Testing Program (DSTP)

Aligned with the rigorous Delaware Content Standards, the Delaware Student Testing Program (DSTP) targets four core content areas: English language arts (reading and writing), mathematics, science, and social studies for students in grade 3, 5, 8, and 10. The DSTP consists of three types of items: multiple-choice, short answer, and extended constructed-response items. The Stanford Achievement Series (9th edition) Reading Comprehension and Mathematical Problem Solving are embedded into the standards-based assessment to derive a standards-based score (a scale score). Percentile rank on the SAT9 sub-tests and the standards-based scores (a combination of selected SAT9 items and Delaware-developed items) are reported at the state, district, school, and individual

levels. Standards-based scores are reported on a developmental scale, ranging approximately from 150 to 800, which is designed to determine student progress over time. Five proficiency levels are used to determine student progress toward the standards: Distinguished, Exceeds the Standard, Meets the Standard, Below the Standard, and Well below the Standard. Throughout this paper, the achievement gap in meeting the standard was examined using two categories: *Meet the Standard* (including Distinguished, Exceeds the Standard, and Meets the Standard) and *Not Meet the Standard* (including Below the Standard and Well below the Standard).

4. Methods and Procedures for Data Analyses

4a. Descriptive statistics

Descriptive statistics and the percent of students meeting or not meeting the standard were reported by grade, test, racial/ethnic group, and year of testing. The effect size (*d*) was calculated for each comparison. The effective size (*d*) measure varies about zero. If white students score higher, *d* is positive; if black students score higher, *d* is negative. Effect size is comparable from measure to measure, even if the score scale on the tests are quite different.

Effect Size (*d*) = (Mean (w) – Mean (b)) / Pooled Standard Deviation

Where:

Mean (w) – The mean for white students
Mean (b) – The mean for black students

4b. Time series analysis

The trend of the black-white achievement gap over the 1993-2001 was examined using time series analysis (McClave and Benson, 1988) by grade and test. Since the statewide testing program changed from 1993-1995 (IAP) to 1998-2000 (DSTP), the effect size was used to calculate the index number (*I*) and the 1993's index number served as the base year for comparisons.

Index Number (*I*) = (*d* (year examined) / *d* (base year)) * 100

Where:

d (year) – The effect size of the year of examined
d (base year) – The effect size of the base year

Longitudinal data can be analyzed for linear and/or quadratic trends. A linear trend is represented as a straight line. A positive linear trend indicates that overall the average performance for a group of students form a gradually rising line; while a negative linear line indicates a gradually declining one, even though wide variation of individual scores or the comparison of the first and the last scores does not show statistically significant difference. A quadratic trend is represented as a simple curve. A positive quadratic trend indicates that scores form a curve with one or both ends higher than the center. A negative quadratic trend curve indicates a simple curve with the center is higher than one

or both ends. It is possible for a series of scores illustrate both a liner and a quadratic trend (NAEP FACTS, 1998). In this study, a positive linear trend indicates an increased achievement gap; while a negative linear trend indicates the reduction of the achievement gap. A positive quadratic trend indicates that the d-values form a curve with a wider achievement gap in one or both ends than the center; while a negative quadratic curve indicates that the d-values form a curve with a narrower achievement gap in one or both ends than the center.

4c. Log-Odds Ratio

Educational researchers called for cautions in comparing differential performance between sub-groups using proficiency levels, such as percent of students meeting the standard. The meaningfulness of a difference in a percent depends on where one starts (Hill, 2000; Holland, 2001; Spratt, 2002). Simple comparison may result in misleading results. For example, changing 10% for one group starting at 50% is one thing, but the same amount of change when starting at 95% is impossible. You just cannot go beyond 100%. It is much easier to increase 10% if the starting point is in the 40-50% range comparing the starting point in the 70-80% range. Obviously a change of 10% in one range is not equivalent to the same change of percent in another range (Spratt, 2002). Measurement experts usually convert percents to an interval scale in test equating and other statistical applications to allow meaningful comparisons. Log-odds ratio is one approach for which a change in one point means the same to another point value no matter where on the scale the change occurs (Hill, 2000). For example, the percent changes from 60% to 70% and from 80% to 90% are both 10%, but the difference of the corresponding log-adds ratios are .442 (.847-.405=.442) for the 60-70% range and .811 (2.197-1.386=.811) for the 80-90% range. Log-odds ratio can be obtained by taking the natural logarithm of the ratio of the proportion of meeting the standard divided by the proportion of not meeting the standard. The transformation is expressed as:

$$\text{Log-Odds} = \ln (P / Q)$$

Where:

P – Percent of students meeting the standard

Q – Percent of students not meeting the standard

4d. Data analyses

The current analyses focused on: (1) the trend of the achievement gap on norm-referenced tests and standards-based assessments during 1993-2001 by grade and test; (2) the patterns of achievement gap between black and white students using two matched-record samples; and (3) the patterns of the achievement gap by gender using the matched-record samples.

Results of the Study

1. The Trend of the Black-White Achievement Gap on Norm-Referenced Tests

1a. Reading

Table 1 compares the average reading NCE scores between black and white students on ITBS/TAP during 1993-1995 and on SAT9 during 1998-2001. The effect sizes (*d*) showed that white students scored about 70% to near 80% of one standard deviation higher than black students in grades 3 and 10 and 80% to 90% of one standard deviation higher than their peers in grades 5 and 8. A quadratic trend, no linear trend, based on the d-values, indicated that the achievement gap remained similar for grades 3 and 5 on the norm-referenced tests over the past 7 years. A negative linear trend for grade 8 indicated that the black-white gap narrowed down slightly from 1993 to 2001. A positive linear trend for grade 10 indicated that the black-white gap became wider in reading. Using 1993 as the base year, the index numbers showed a positive quadratic trend, no linear trend for grade 3; a positive quadratic trend and a relatively negative linear trend for grades 5 and 8; and a negative quadratics and a positive linear trend for grade 10 (Figure 1). The index numbers (*I*) suggested that since 1993 the achievement gap between black and white students had remained the same in grade 3, declined slightly for grades 5 and 8, and increased for grade 10 in reading on the norm-referenced tests.

1b. Mathematics

Table 2 compares the average mathematics NCE scores between black and white students on ITBS/TAP during 1993-1995 and on SAT9 during 1998-2001. The effect sizes (*d*) showed that white students scored about 80% to near 90% of one standard deviation higher than black students in grades 3, 5, and 8 and 70% to 80% of one standard deviation higher than their peers in grade 10. The nearly equal *d*-values for grades 3 and 8 indicated that the achievement gap remained similar in mathematics over the past 7 years. A positive quadratic trend and a relatively negative linear trend of the *d*-values for grade 5 indicated a decreased trend in the achievement gap. The positive quadratic trend for grade 10 showed that the achievement gap line dropped slightly and then rose. Using 1993 as the base year, the index numbers showed a positive quadratic trend for grades 3 and 10, that is, the achievement gap narrowed down slightly and then widened up (Figure 2). For grades 5 and 8, the index numbers showed a positive quadratic trend and a relatively straight-line decrease of the black-white gap. The index numbers (*I*) suggested that since 1993 the achievement gap between black and white students has remained similar for grades 3 and 10 and slightly declined for grades 5 and 8 in mathematics on the norm-referenced tests.

2. The Trend of the Black-White Achievement Gap on Standards-Based Assessments

2a. Reading

Table 3 presents the average reading scale scores for black and white students on the IAP during 1993-1995 and on the DSTP during 1998-2001. The effect sizes (*d*) showed that white students scored about 60% to 80% of one standard deviation higher than black students in grades 3, 8, and 10 and about 50% to near 90% of one standard deviation higher than their peers in grade 5. Both d-values and index numbers showed a negative quadratic and a positive linear trend of the achievement gap in grade 3, 5, and 8, that is the black-white gap relatively increased for those three grades (Figure 3). The achievement gap for grade 10 showed a positive quadratic and a positive linear trend

because both the d- and I-values fell and then rose with an overall increased trend. The index numbers (*I*) suggested an overall rising line of the achievement gap since 1993 for all four grades in reading on standard-based assessments.

2b. Mathematics

Table 4 presents the average mathematics scale scores for black and white students on the IAP during 1993-1995 and on the DSTP during 1998-2001. The effect sizes (*d*) showed that white students scored about 70% to 90% of one standard deviation higher than black students in grade 3 and about 80% to 90% of one standard deviation higher than their peers in grades 5, 8, and 10. The positive linear trend, no quadratic trend indicated by d-values for grades 3 and 5 suggested a relatively straight-line increase of the achievement gap. A positive quadratic trend, falling slightly and then rising, was shown for grades 8 and 10, and no linear trend. Similarly, the index numbers (*I*) showed a positive linear trend for grades 3 and 5 and a positive quadratic trend for grades 8 and 10 (Figure 4). The index numbers (*I*) suggested that since 1993 the achievement gap between black and white students had widened in grades 3 and 5, but remained similar in grades 8 and 10 in mathematics on standard-based assessments.

3. The Trend of the Black-White Gap in Meeting the Standards

Because the number of proficiency levels and the procedures for setting the cut-scores are quite different for the IAP and the DSTP, the difference of academic achievement toward the standard between black and white students was examined on the DSTP only. Table 5 shows the cut-scores used to determine proficiency levels on the DSTP.

3a. Reading

The difference in the percent of meeting the standard between black and white students decreased slightly during 1998-2001 in grade 3 (from 30% to 27%), grade 5 (from 34% to 32%), and grade 8 (from 32% to 28%), but remained the same (31%) in grade 10 (Table 6). The log-odds ratios, however, suggested no trend of reduction in the black-white achievement gap in reading. For example, in grade 3, the log-odds ratios are 1.24, 1.30, 1.68, and 1.40 for 1998 to 2001, respectively. In grade 10, the log-odds rations are 1.28, 1.30, 1.29 and 1.29 for 1998 to 2001, respectively.

3b. Mathematics

The difference in the percent of meeting the standard between black and white students narrowed down slightly in grade 3 (from 35% to 31%) and grade 5 (from 36% to 35%); but increased in grade 8 (from 31% to 34%) and grade 10 (from 26% to 32%) (Table 7). The log-odds ratios suggested, however, that there has been no changes in the achievement gap for grades 5 (1.53, 1.53, 1.58, and 1.55 from 1998 to 2001, respectively) and 8 (1.60, 2.00, 1.60, and 1.57 from 1998 to 2001, respectively); but actually would have increased a trivial amount for grade 3 (1.44, 1.58, 1.43, and 1.56 from 1998 to 2001, respectively) and grade 10 (1.57, 1.64, 1.64, and 1.67 from 1998 to 2001, respectively).

4. The Black-White Achievement Gap in Reading for the Matched Samples

As described in *Samples of Students*, the matched records were selected from student populations based on predetermined criteria. Table 8 shows the sample size and the percent of students for each group. The proportion of black and white students in each sample was close to the proportion of the corresponding population. For example, in grade 5, there was 30% of blacks and 70% of whites in the sample, while 32% of blacks and 68% of whites in the corresponding population.

4a. Grads 3 and 5 Reading

The mean difference between black and white students in NCE scores was 12.9 for grade 3 and 14.7 for grade 5 (Table 9). The increased *d*-values (from .70 in grade 3 to .79 in grade 5) indicated that the achievement gap widened in a trivia amount, that is, white students scored about 70% of one standard deviation higher than black students in grade 3, but near 80% of one standard deviation higher in grade 5. A similar pattern was observed on the black-white achievement gap on the scale scores (d=.72 for grade3, d=.83 for grade 5). The wider gap was probably due to the greater improvement of the average score for white students than their peers by 4 points from grade 3 to grade 5.

Table 10 shows the difference in percent of meeting the standard between black and white students in reading, 27% in grade 3 and 32% in grade 5. The log-odds ratios suggested a wider achievement gap from grade 3 (1.18) to grade 5 (1.48).

4b. Grads 8 and 10 Reading

The mean difference between black and white students in NCE scores was 14.4 in grade 8 and 12.7 in grade 10 (Table 9). Actually the average NCE scores decreased by 7-9 points for both groups from grade 8 to grade 10. The *d*-values suggested that the achievement gap remained the same (d=.77 for grade 8; d=.78 for grade 10), no change for the matched sample. Similarly, there were no changes on the scale scores (d=.72 for grade 8, d=.75 for grade 10) because white students failed to show any improvement, on the average, from grade 8 to grade 10.

The difference in percent of meeting the standard between black and white students was 28% in grade 8 and 29% in grade 10. The log-odds ratios suggested that the gap remained nearly the same in reading from grade 8 (1.28) to grade 10 (1.23).

5. The Black-White Achievement Gap in Mathematics for the Matched Samples

5a. Grades 3 and 5 Mathematics

The mean difference between black and white students in NCE scores was 14.0 in grade 3 and 18.0 in grade 5 (Table 11). The increased *d*-values from .74 for grade 3 to .88 for grade 5 indicated that the achievement gap widened, that is, white students scored about 70% of one standard deviation higher than black students in grade 3 and nearly 80% of one standard deviation higher in grade 5. Similarly, a wider gap was observed on the scale scores (d=.82 in grade3, d=.93 in grade 5) because of a higher average score for white students than their peers in grade 5.

The difference in percent of meeting the standard between black and white students in mathematics was 33% in grade 3 and 39% in grade 5 (Table 12). The log-odds ratio increased from 1.39 in grade 3 to 1.67 in grade 5, which suggested a slightly wider achievement gap.

5b. Grades 8 and 10 Mathematics

The mean difference between black and white students on NCE scores was 14.0 for grade 8 and 14.8 for grade 10 (Table 11). The same *d*-values (*d*=.75 for both grades) indicated no changes of the achievement gap from grade 8 to grade 10. The difference of the average scale scores between black and white students was 32.4 in grade 8 and 28.5 in grade 10. The *d*-values suggested that the achievement gap remained similar even though black students improved the average score more than white students by 4-points from grade 8 to grade 10.

The difference in percent of meeting the standard between black and white students was 33% in grade 8 and 31% in grade 10. The similar log-odds ratios for in grade 8 (1.52) and grade 10 (1.57) suggested that the achievement gap remained the same.

6. The Black-White Achievement Gap by Gender in Reading for the Matched Samples

6a. Grades 3 and 5 Reading

From grade 3 to grade 5, the difference in percent of meeting the standard increased slightly from 36% to 38% for females and from 13% to 23% for males between black and white students (Table 13a). Even though both female groups improved their performance, 2% for blacks (45%-43%=2%) and 4% for whites (84%-80%=4%), the log-odd ratios showed that the achievement gap still increased a trivial amount from grade 3 (1.62) to grade 5 (1.82) because they started in the different range on the scale, 40-45% for blacks and 80-85% for whites. The log-odds ratios also suggested that the achievement gap widened between black and white male students from grade 3 (.57) to grade 5 (1.05) because the percent of meeting the standard increased by 7% for white male students, but reduced by 3% for black male students.

6b. Grades 8 and 10 Reading

From grade 8 to grade 10, the difference in percent of meeting the standard increased slightly from 25% in grade 8 to 28% in grade 10 for females and reduced slightly from 33% to 31% for males between black and white students (Table 13b). The similar log-odds ratios in grade 8 (1.27) and grade 10 (1.24) suggested that the achievement gap remained the same for females because the reduction of the percent of meeting the standard for both black females (by 10%) and white females (by 7%). The decreased log-odds ratios (from 1.41 to 1.30) indicated that the black-white achievement gap actually reduced a trivial amount for males from grade 8 to grade 10.

7. The Black-White Achievement Gap by Gender in Mathematics for the Matched Samples

7a. Grades 3 and 5 Mathematics

From grade 3 to grade 5, the difference in the percent of meeting the standard increased for both females (from 30% to 37%) and males (from 37% to 40%) between black and white students. White female students improved the percent of meeting the standard by 7% and white male students improved by 5%; while both black female and male students hold a similar percent from grade 3 to grade 5 (38% for both grades for females; from 35% to 36% for males). The log-odds ratios indicated that the achievement gap widened a trivial amount between black and white students for both females (1.23 to 1.59) and males (1.56 to 1.75). In fact, the only reason for the wider gap is that both female and male black students failed to show improvement in mathematics from grade 3 to grade 5, as compared with the corresponding sub-groups of white students.

7b. Grades 8 and 10 Mathematics

From grade 8 to grade 10, the difference in percent of meeting the standard remained 28% for females, but reduced by 3% for males (from 38% to 35%) between black and white students (Table 14b). The percent of students meeting the standard decreased by 5% for both black and white females from grade 8 to grade 10, by 3% for black males and by 6% for white males. The log-odds ratios suggested that the achievement gap increased by a trivial amount for females (from 1.30 to 1.39) and remained similar gap for males (from 1.77 to 1.76) from grade 8 to grade 10 in mathematics.

Findings of the Study

Based on the initial analysis, the current study focused on the trends of the achievement gap between black and white students in reading and mathematics using longitudinal data from 1993 to 2001. The achievement gap was further examined using two matched-record samples on students' progress toward the standard from grade 3 to grade 5 and from grade 8 to grade 10. The preliminary findings are summarized below:

1. The effect sizes showed that, on the average, white students scored about 70% to 90% of one standard deviation higher than black students in reading and mathematics on norm-referenced tests across the four grades; while white students scored about 50% to 90% of one standard deviation higher than their peers in reading and 70% to 90% in mathematics on standards-based assessments.

2. For norm-referenced tests, the results of the time series analysis suggested that the achievement gap between black and white students had remained the same in grade 3, declined slightly in grades 5 and 8, and an increased trend in grade 10 in reading; the gap had remained similar in grades 3 and 10 and slightly declined in grades 5 and 8 in mathematics since 1993.

3. For standards-based assessments, the results of the time series analysis suggested an overall rising line of the achievement gap between black and white students for all grades 3, 5, 8, and 10 since 1993. The achievement gap had widened in mathematics for grades 3 and 5, but remained nearly the same, no changes for grades 8 and 10 since 1993.

4. In comparing the difference in the percent of students meeting the standard, the log-odds ratios showed no trend of reduction in reading for all the four grades; a trivial increase trend suggested for grades 3 and 10, but no changes for grades 5 and 8 in mathematics during 1998-2001.

5. A slightly widened achievement gap in reading was suggested by effect sizes on both NCE and scale scores for the matched-record sample of students when they moved from grade 3 to grade 5. The log-odds ratios also showed a wider achievement gap in the percent of students meeting the standard between black and white students (log-odds ratio=1.18 for grade 3; log-odds ratio=1.48 for grade 5). A similar pattern was found in mathematics for the same group of students, a widened achievement gap in NCE scores, scale scores, and the percent of students meeting the standard, for the same group of student.

6. No overall changes in the achievement gap between black and white students were suggested by the effect size in both reading and mathematics for the matched-record sample of students when they moved from grade 8 to grade 10. The log-odds ratios indicated that the difference in the percent of students meeting the standard between black and white students remained nearly the same in grade 8 (log-odds ratio=1.52) and grade 10 (log-odds ratio=1.57) for the matched sample.

7. From grade 3 to grade 5, the achievement gap in the percent of meeting the standard increased a trivial amount in reading for females (log-odds ratio=1,62 for grade 3; log-odds ratio=1.82 for grade 5), but widened for males (log-odds ratio=.57 for grade 3; log-odd ratio=1.05 for grade 5); while the gap increased in a trivia amount for both females (log-odds ratio=1.23 for grade 3; log-odds ratio=1.59 for grade 5) and males (log-odds ratio=1.56 for grade 3; log-odds ratio=1.75 for grade 5) in mathematics.

8. From grade 8 to grade 10, the achievement gap in the percent of meeting the standard remained the same in reading for females (log-odds ratio=1.27; log-odds ratio=1.24 for grade 10), but reduced a trivial amount for males (log-odds ratio=1.41 for grade 8; log-odds ratio=1.30 for grade 10); while the gap slightly increased in mathematics for females (log-odds ratio=1.30 for grade 8; log-odds ratio=1.39 for grade 10), but remained the same for males (log-odds ratio=1.77 for grade 8; log-odds ratio=1.76 for grade 10).

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Table 1
Average NCE Scores in Reading by Racial/Ethnic Group and Grade

Grade 3	Black Students			White Students			Mean	*d*	*I*
Year	*N.*	*Mean*	*S.D.*	*N.*	*Mean*	*S.D.*	*Difference*		
1993	2073	35.7	17.5	5304	51.0	20.5	15.3	0.78	100.00
1994	2261	34.3	18.2	5450	49.0	20.5	14.7	0.74	95.14
1995	2398	33.7	17.9	5360	49.1	20.0	15.4	0.79	102.25
1998	2556	41.2	17.4	5204	55.3	20.7	14.1	0.72	92.29
1999	2624	43.8	17.1	5292	58.3	19.6	14.5	0.77	99.28
2000	2789	46.7	17.0	5122	59.8	19.1	13.1	0.71	91.75
2001	2657	49.1	16.3	4846	62.5	18.0	13.4	0.77	99.08
Grade 5									
Year									
1993	2116	37.2	17.0	5207	53.2	18.6	16.0	0.88	100.00
1994	2326	36.4	16.8	5201	51.6	19.2	15.2	0.82	93.50
1995	2286	35.8	17.4	5268	52.0	19.6	16.2	0.85	97.12
1998	2595	39.1	19.4	5078	55.1	20.9	16.0	0.78	89.15
1999	2629	40.1	18.3	5441	55.5	19.6	15.4	0.80	91.26
2000	2606	41.2	18.7	5142	56.4	20.0	15.2	0.78	88.29
2001	2397	44.2	18.0	4811	59.0	18.2	14.8	0.82	92.79
Grade 8									
Year									
1993	1890	38.3	17.3	4955	54.2	19.1	15.9	0.85	100.00
1994	1961	38.0	17.4	5171	53.8	19.2	15.7	0.84	98.83
1995	2071	37.1	17.6	5317	53.4	19.2	16.3	0.87	102.04
1998	2499	41.2	19.2	5486	57.1	20.5	15.9	0.79	92.84
1999	2482	41.8	18.9	5606	56.9	20.0	15.1	0.77	90.11
2000	2603	43.2	19.5	5556	58.9	20.4	15.7	0.78	91.61
2001	2418	46.3	18.7	5044	61.2	19.2	14.9	0.78	91.86
Grade 10									
Year									
1993	1347	42.8	18.5	4125	56.2	20.5	13.4	0.67	100.00
1994	1508	42.5	18.4	4271	55.7	20.7	13.2	0.66	98.68
1995	1555	41.1	18.1	4403	55.0	21.0	13.9	0.68	102.48
1998	1981	35.4	17.0	5061	48.3	17.9	12.9	0.73	109.58
1999	2134	34.7	17.0	5132	47.1	17.9	12.4	0.70	105.40
2000	2169	36.6	16.8	5113	50.1	17.3	13.5	0.79	118.01
2001	2018	38.0	17.0	4959	51.9	17.1	13.9	0.81	122.09

Table 2
Average NCE Scores in Mathematics by Racial/Ethnic Group and Grade

Grade 3	Black Students			White Students			Mean	d	I
Year	*N.*	*Mean*	*S.D.*	*N.*	*Mean*	*S.D.*	*Difference*		
1993	2093	32.2	17.4	5332	48.9	20.8	16.8	0.84	100.00
1994	2219	33.1	18.5	5276	49.6	20.8	16.4	0.82	96.87
1995	2314	33.4	18.3	5203	50.5	20.7	17.1	0.86	101.72
1998	2554	40.3	18.3	5213	55.6	21.0	15.3	0.76	90.21
1999	2623	43.2	19.0	5298	59.7	20.6	16.5	0.82	97.61
2000	2792	48.3	18.6	5122	63.4	20.1	15.1	0.77	91.61
2001	2707	51.0	19.4	4909	66.8	19.9	15.8	0.80	95.18
Grade 5									
Year									
1993	2120	35.5	17.7	5208	52.4	19.7	16.9	0.88	100.00
1994	2281	34.6	18.2	5041	51.4	20.3	16.8	0.85	96.79
1995	2208	33.9	18.3	5167	50.7	19.9	16.9	0.87	98.50
1998	2587	38.2	21.1	5072	57.0	23.3	18.8	0.83	94.45
1999	2625	39.1	21.0	5440	58.1	22.8	19.0	0.85	96.96
2000	2612	41.5	20.7	5142	59.7	22.3	18.2	0.84	94.82
2001	2453	46.5	20.6	4866	63.5	20.8	17.0	0.82	93.02
Grade 8									
Year									
1993	1886	38.9	15.9	4963	54.2	18.9	15.2	0.84	100.00
1994	1958	37.8	16.4	5174	53.2	19.4	15.4	0.83	98.64
1995	2045	36.7	16.1	5307	53.2	19.6	16.5	0.88	105.00
1998	2480	38.6	17.2	5465	53.5	20.3	14.9	0.77	91.60
1999	2487	38.3	16.8	5622	53.0	19.9	14.7	0.77	92.19
2000	2608	40.5	17.7	5536	56.0	20.3	15.5	0.79	94.70
2001	2354	42.5	17.3	4963	57.2	19.9	14.7	0.77	91.71
Grade 10									
Year									
1993	1337	39.9	16.5	4043	54.3	19.2	14.4	0.77	100.00
1994	1495	38.9	17.2	4221	54.3	19.6	15.4	0.81	104.18
1995	1541	39.6	17.0	4396	53.9	20.0	14.4	0.75	96.29
1998	1965	37.1	16.4	5047	50.6	20.1	13.5	0.71	91.04
1999	2166	35.5	16.1	5164	49.3	20.0	13.8	0.73	94.07
2000	2166	37.8	17.5	5109	52.6	20.6	14.8	0.75	96.81
2001	1953	39.8	17.8	4878	55.7	20.7	15.9	0.80	103.03

Table 3
Average Scale Scores in Reading by Racial/Ethnic Group and Grade

Grade 3	Black Students			White Students			Mean	*d*	*I*
Year	*N.*	*Mean*	*S.D.*	*N.*	*Mean*	*S.D.*	*Difference*		
1993	2065	501.4	74.1	5277	539.9	61.2	38.5	0.59	100.00
1994	2261	487.8	78.4	5432	532.8	64.2	45.1	0.66	111.07
1995	2445	486.0	75.2	5404	540.3	66.2	54.4	0.79	133.10
1998	2556	398.3	41.6	5205	429.7	42.8	31.4	0.74	125.43
1999	2624	406.6	39.1	5291	436.7	39.6	30.0	0.76	128.78
2000	2788	415.7	39.5	5121	443.5	38.8	27.8	0.71	120.57
2001	2657	418.7	35.7	4846	446.8	35.3	28.1	0.79	134.21
Grade 5									
Year									
1993	2100	527.1	53.9	5167	553.1	46.4	26.0	0.53	100.00
1994	2321	516.3	57.7	5232	551.5	50.2	35.3	0.67	125.41
1995	2298	512.1	68.4	5290	556.3	54.2	44.2	0.75	140.48
1998	2599	434.4	42.1	5078	471.0	43.7	36.6	0.85	158.49
1999	2629	436.7	40.4	5441	471.7	41.4	35.0	0.85	159.44
2000	2606	443.2	40.7	5141	476.4	41.3	33.2	0.81	151.31
2001	2397	449.4	38.4	4811	482.2	38.7	32.8	0.85	159.04
Grade 8									
Year									
1993	1863	504.5	69.1	4938	541.4	60.6	36.9	0.59	100.00
1994	1996	501.6	73.3	5213	539.3	62.7	37.7	0.57	97.89
1995	2132	496.3	74.6	5393	539.4	61.1	43.1	0.66	113.07
1998	2496	486.7	39.5	5484	516.1	38.0	29.4	0.76	130.50
1999	2480	487.0	40.4	5605	515.5	40.3	28.4	0.71	120.49
2000	2600	488.8	40.7	5554	519.0	37.6	30.3	0.78	133.98
2001	2417	496.8	36.4	5041	523.1	34.1	26.3	0.75	128.93
Grade 10									
Year									
1993	1331	498.2	85.9	4133	555.2	68.1	57.0	0.78	100.00
1994	1514	494.2	89.8	4366	554.3	71.4	60.1	0.78	100.30
1995	1634	493.7	93.7	4512	541.7	79.9	48.0	0.57	73.28
1998	1981	485.9	40.1	5059	515.6	39.8	29.8	0.75	95.30
1999	2127	480.0	40.7	5125	510.4	42.0	30.5	0.73	93.50
2000	2166	486.8	40.6	5112	518.1	41.3	31.3	0.76	97.34
2001	2017	489.3	38.1	4958	519.8	36.9	30.5	0.82	104.65

Table 4
Average Scale Scores in Mathematics by Racial/Ethnic Group and Grade

Grade 3	Black Students			White Students			Mean	*d*	*I*
Year	*N.*	*Mean*	*S.D.*	*N.*	*Mean*	*S.D.*	*Difference*		
1993	2056	484.9	73.7	5294	536.8	70.8	51.9	0.73	100.00
1994	2266	481.3	76.8	5459	538.6	71.3	57.2	0.78	108.21
1995	2456	482.0	78.8	5411	539.7	74.5	57.8	0.76	105.04
1998	2554	388.2	34.9	5213	419.5	39.2	31.3	0.83	113.98
1999	2622	395.8	37.9	5298	431.2	40.1	35.4	0.90	124.00
2000	2791	406.8	36.0	5120	439.3	39.7	32.5	0.85	116.60
2001	2707	409.9	37.0	4909	444.2	39.6	34.3	0.89	122.22
Grade 5									
Year									
1993	2095	469.2	56.7	5176	523.2	68.3	54.0	0.83	100.00
1994	2339	464.0	58.9	5227	518.3	70.8	54.4	0.81	97.35
1995	2306	454.7	61.8	5277	516.9	70.8	62.2	0.91	110.04
1998	2587	425.1	36.9	5073	460.0	39.5	34.9	0.90	109.01
1999	2624	428.7	35.7	5440	462.6	38.6	33.9	0.90	108.68
2000	2611	433.3	34.8	5140	467.0	39.5	33.6	0.89	106.83
2001	2451	440.5	34.8	4867	474.2	37.2	33.7	0.93	111.65
Grade 8									
Year									
1993	1854	459.4	70.8	4950	524.3	72.4	64.9	0.90	100.00
1994	1963	444.5	79.9	5187	517.4	82.1	72.9	0.89	99.15
1995	2170	447.6	73.1	5423	518.5	81.5	70.9	0.90	99.21
1998	2476	456.6	33.2	5463	490.6	43.2	34.0	0.84	93.32
1999	2484	457.9	31.1	5620	489.7	40.7	31.9	0.84	92.81
2000	2607	461.7	33.1	5536	494.9	40.2	33.2	0.87	96.43
2001	2354	466.9	31.6	4963	498.6	36.9	31.7	0.90	99.55
Grade 10									
Year									
1993	1340	480.3	73.3	4082	538.7	63.5	58.4	0.88	100.00
1994	1519	472.3	94.1	4350	533.6	72.6	61.3	0.78	88.24
1995	1614	470.3	81.0	4523	533.1	71.5	62.8	0.85	96.00
1998	1958	489.5	28.6	5042	516.7	38.5	27.2	0.76	85.51
1999	2156	487.6	28.8	5158	515.6	37.3	27.9	0.80	90.32
2000	2165	491.6	29.3	5104	521.2	38.8	29.6	0.82	92.55
2001	1951	496.0	27.2	4877	525.2	36.3	29.2	0.86	97.40

Table 5
Cut-off Scores for Proficiency Levels by Test and Grade

Level	Reading				Mathematics			
	Grade 3	Grade 5	Grade 8	Grade 10	Grade 3	Grade 5	Grade 8	Grade 10
Distinguished	482	529	584	593	499	525	549	574
Exceeds the Standard	465	508	564	573	464	503	531	559
Meets the Standard	***411***	***451***	***500***	***502***	***407***	***449***	***493***	***525***
Below the Standard	387	427	475	477	382	424	469	500
Well Below the Standard	386 and below	426 and below	474 and below	476 and below	381 and below	423 and below	468 and below	499 and below

Table 6

Percentages of Students Meeting the Standard in Reading by Racial/Ethnic Group and Grade

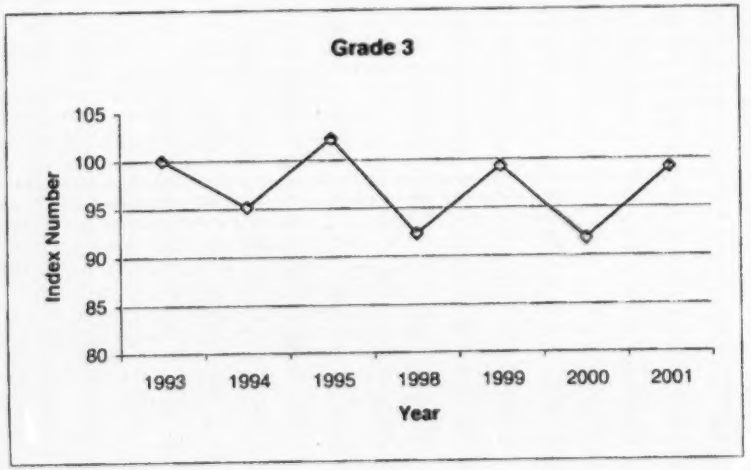
Grade 3	Total		Black Student		Log-Odds	White Student		Log-Odds	Difference	
Year	*Meet*	*Not Meet*	*Meet*	*Not Meet*	*Ratio*	*Meet*	*Not Meet*	*Ratio*	*Meet*	*Ratio*
1998	61.5	38.5	40.5	59.5	-0.38	70.1	29.9	0.85	29.6	1.24
1999	68.6	31.4	47.6	52.4	-0.10	77.0	23.0	1.21	29.4	1.30
2000	76.8	23.2	58.1	41.9	0.33	88.1	11.9	2.00	30.0	1.68
2001	75.1	24.9	58.8	41.2	0.36	85.3	14.7	1.76	26.5	1.40
Grade 5										
Year										
1998	59.0	41.0	35.2	64.8	-0.61	69.6	30.4	0.83	34.4	1.44
1999	62.8	37.2	37.6	62.4	-0.51	72.1	27.9	0.95	34.5	1.46
2000	69.3	30.7	43.7	56.3	-0.25	75.9	24.1	1.15	32.2	1.40
2001	68.7	31.3	48.4	51.6	-0.06	79.9	20.1	1.38	31.5	1.44
Grade 8										
Year										
1998	60.8	39.2	38.1	61.9	-0.49	69.9	30.1	0.84	31.8	1.33
1999	62.2	37.8	40.6	59.4	-0.38	69.2	30.8	0.81	28.6	1.19
2000	67.4	32.6	43.1	56.9	-0.28	74.4	25.6	1.07	31.3	1.34
2001	68.0	32.0	49.9	50.1	0.00	77.4	22.6	1.23	27.5	1.24
Grade 10										
Year										
1998	58.7	41.4	35.2	64.8	-0.61	66.2	33.8	0.67	31.0	1.28
1999	53.7	46.3	30.1	69.9	-0.84	61.3	38.7	0.46	31.2	1.30
2000	61.3	38.7	36.7	63.3	-0.55	67.9	32.1	0.75	31.2	1.29
2001	61.2	38.8	39.8	60.2	-0.41	70.6	29.4	0.88	30.8	1.29

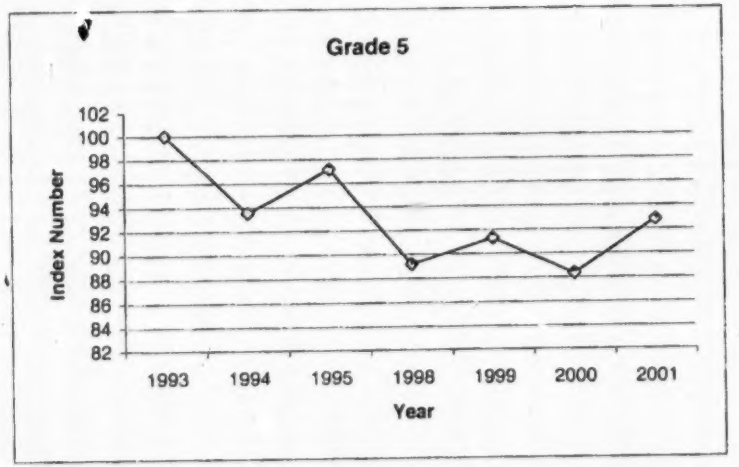
Table 7

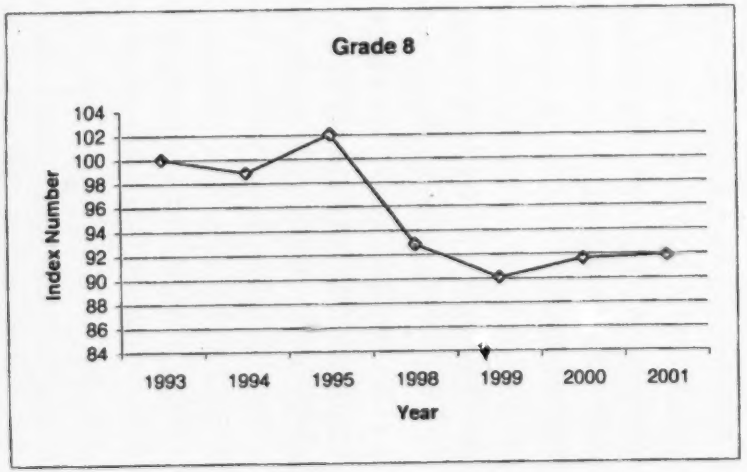
Percentages of Students Meeting the Standard in Mathematics by Racial/Ethnic Group and Grade

Grade 3	Total		Black Student		Log-Odds	White Student		Log-Odds	Difference	
Year	*Meet*	*Not Meet*	*Meet*	*Not Meet*	*Ratio*	*Meet*	*Not Meet*	*Ratio*	*Meet*	*Ratio*
1998	54.8	*45.2*	29.9	70.1	-0.85	64.8	35.2	0.61	*34.9*	*1.46*
1999	63.5	*36.5*	37.3	62.7	-0.52	74.3	25.7	1.06	*37.0*	*1.58*
2000	72.7	*27.3*	49.6	50.4	-0.02	80.4	19.6	1.41	*30.8*	*1.43*
2001	73.4	*26.6*	53.6	46.4	0.14	84.6	15.4	1.70	*31.0*	*1.56*
Grade 5										
Year										
1998	52.3	*47.7*	27.2	72.8	-0.98	63.3	36.7	0.55	*36.1*	*1.53*
1999	55.4	*44.6*	29.1	70.9	-0.89	65.4	34.6	0.64	*36.3*	*1.53*
2000	62.1	*37.9*	32.8	67.2	-0.72	70.4	29.6	0.87	*37.6*	*1.58*
2001	65.0	*35.0*	41.9	58.1	-0.33	77.3	22.7	1.23	*35.4*	*1.55*
Grade 8										
Year										
1998	36.1	*64.0*	14.2	85.8	-1.80	45.1	54.9	-0.20	*30.9*	*1.60*
1999	35.8	*64.2*	13.7	86.3	-1.84	53.9	46.1	0.16	*40.2*	*2.00*
2000	41.2	*58.8*	16.6	83.4	-1.61	49.6	50.4	-0.02	*33.0*	*1.60*
2001	42.9	*57.1*	19.6	80.4	-1.41	54.0	46.0	0.16	*34.4*	*1.57*
Grade 10										
Year										
1998	31.1	*68.9*	11.1	88.9	-2.08	37.5	62.5	-0.51	*26.4*	*1.57*
1999	30.5	*69.5*	10.3	89.7	-2.16	37.2	62.8	-0.52	*26.9*	*1.64*
2000	35.6	*64.4*	12.5	87.5	-1.95	42.5	57.5	-0.30	*30.0*	*1.64*
2001	36.7	*63.3*	13.7	86.3	-1.84	45.8	54.2	-0.17	*32.1*	*1.67*

Figure 1.
The Trend of Achievement Gap between Black and White Students on NCE Scores in Reading







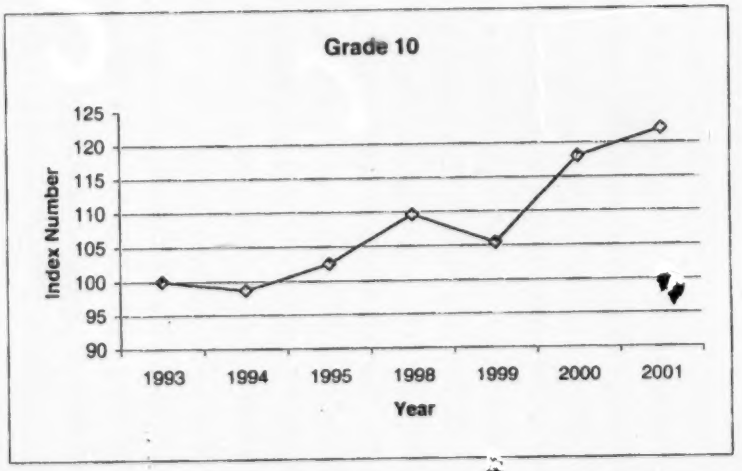
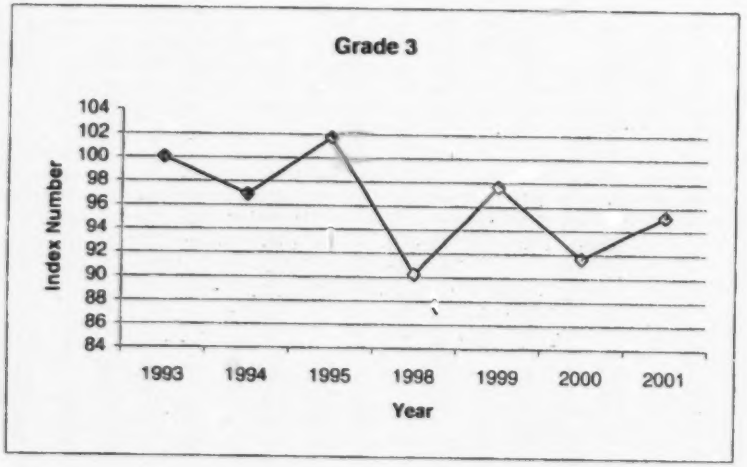
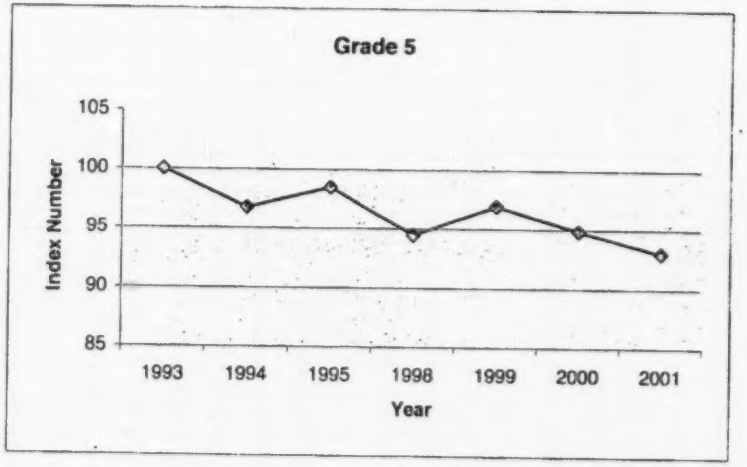
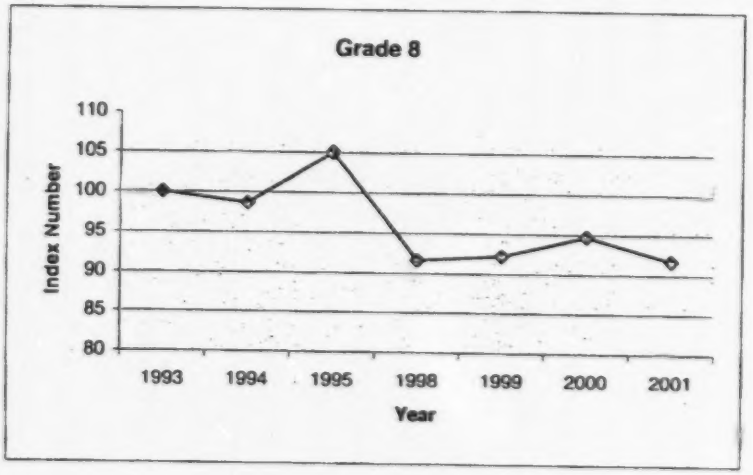


Figure 2.
The Trend of Achievement Gap between Black and White Students on NCE Scores in Mathematics







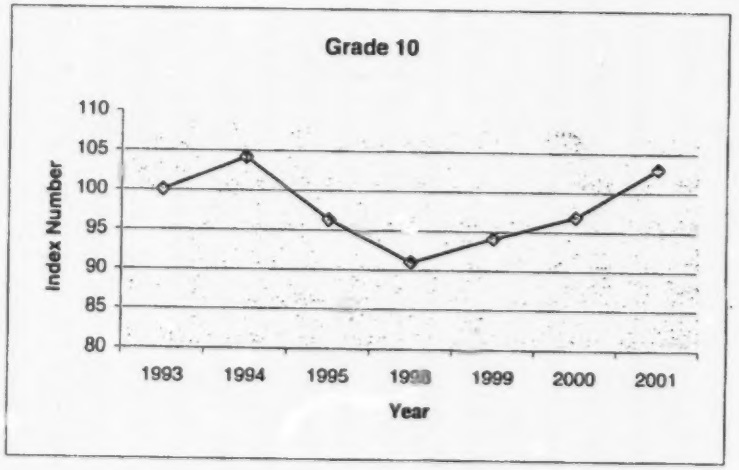
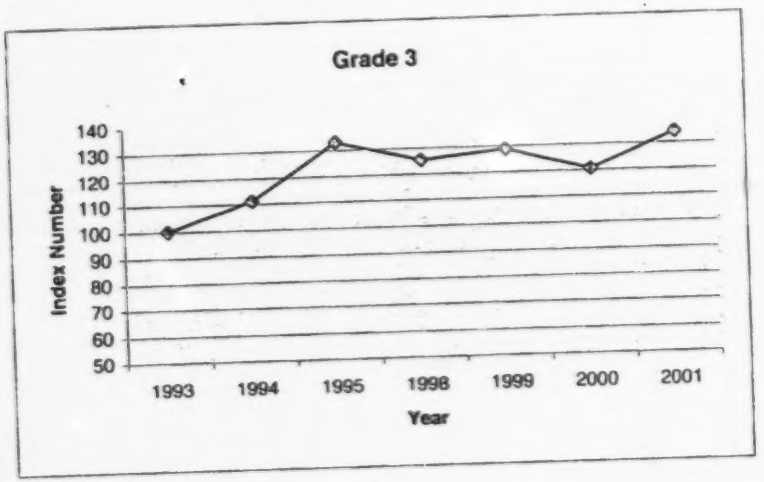
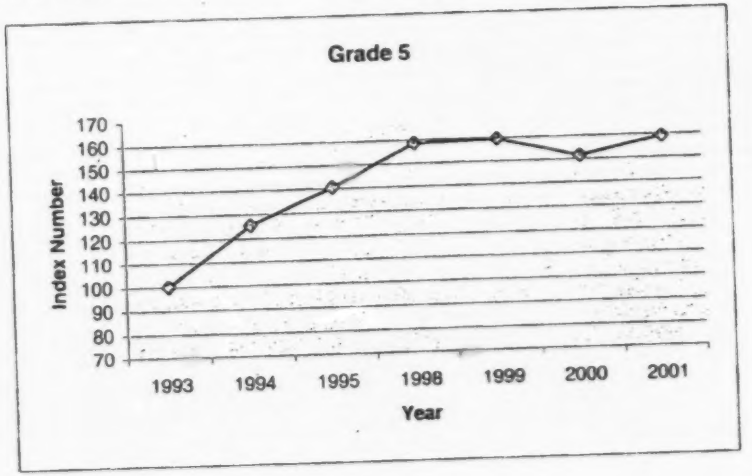
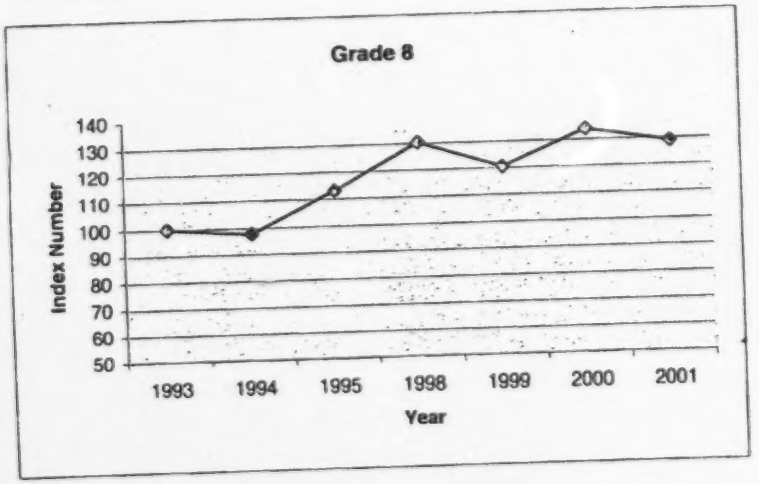


Figure 3.
The Trend of Achievement Gap between Black and White Students on Scale Scores in Reading







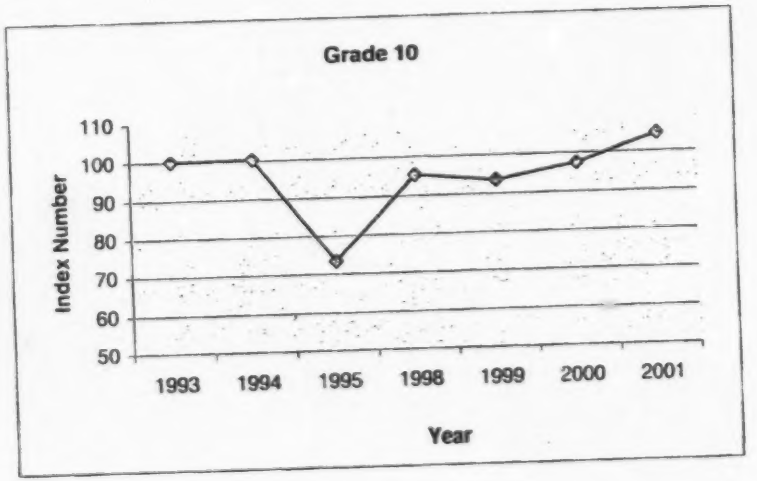
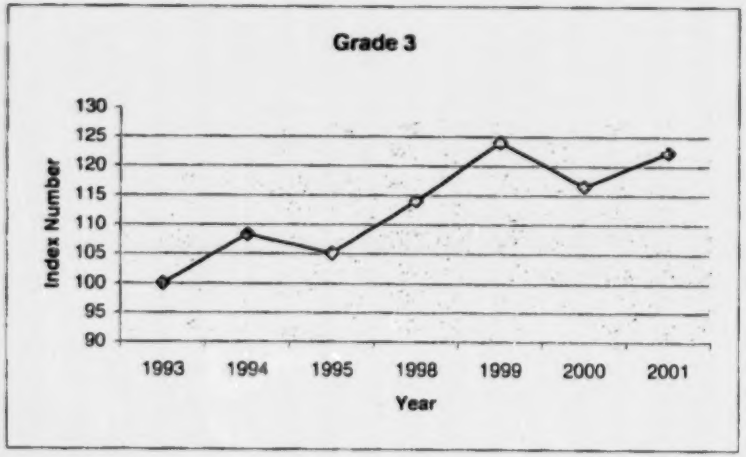
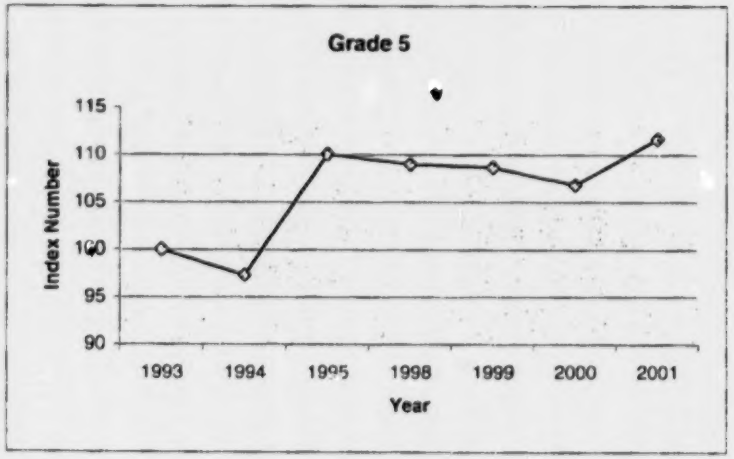
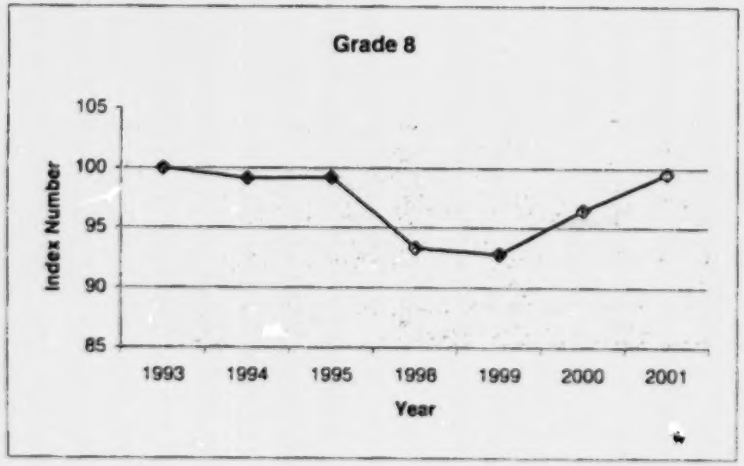


Figure 4.
The Trend of Achievement Gap between Black and White Students on Scale Scores in Mathematics







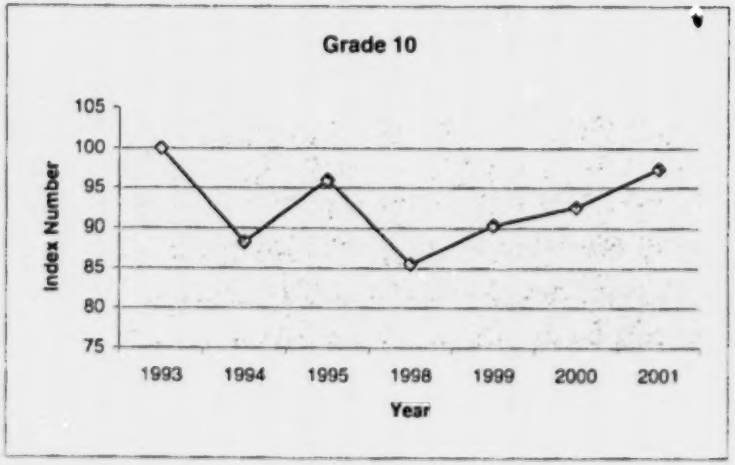


Table 8
Comparisons of the Matched Sample with the Populations

Matched *Sample 1*		Black Students		White Students	
		Sample	*Population*	*Sample*	*Population*
Grade 3 *(1998)*	*N.*	1799	2374	4155	5031
	%	*0.30*	*0.32*	*0.70*	0.68
Grade 5 *(2000)*	*N.*	1799	2277	4155	4764
	%	*0.30*	*0.32*	*0.70*	0.68
Matched ***Sample 2***					
Grade 8 *(1998)*	*N.*	1417	2384	3879	5398
	%	*0.27*	*0.31*	*0.73*	0.69
Grade 10 *(2000)*	*N.*	1417	1985	3879	4853
	%	*0.27*	*0.29*	*0.73*	0.71

Table 9

Average Test Scores in Reading for Matched Sample by Racial/Ethnic Group

Matched	NCE Score			Difference		Scale Score		Difference	
Sample 1	*N.*	*Mean*	*S.D*	*Mean*	*d*	*Mean*	*S.D.*	*Mean*	*d*
Grade 3 *(1998)*									
Black Students	1799	44.7	16.2	12.9	0.70	408.6	37.1	27.1	0.72
White Student	4155	57.6	19.4			435.6	38.0		
Grade 5 *(2000)*									
Black Students	1799	44.0	17.7	14.7	0.79	450.8	37.3	31.3	0.83
White Student	4155	58.7	18.9			482.1	37.7		
Gain Score									
Black Students		-0.70		1.8		42.2		4.2	
White Student		1.10				46.4			

Matched	NCE Score			Difference		Scale Score		Difference	
Sample 2	*N.*	*Mean*	*S.D*	*Mean*	*d*	*Mean*	*S.D.*	*Mean*	*d*
Grade 8 *(1998)*									
Black Students	1417	46.4	18.0	14.4	0.77	499.8	35.3	24.6	0.72
White Student	3879	60.8	18.9			524.3	33.0		
Grade 10 *(2000)*									
Black Students	1417	39.3	16.0	12.7	0.78	495.6	36.8	28.0	0.75
White Student	3879	52.0	16.4			523.6	37.8		
Gain Score									
Black Students		-7.10		-1.7		-4.2		3.4	
White Student		-8.80				-0.8			

Table 10
Percentage of Students Meeting the Standard in Reading by Racial/Ethnic Group

Grade 3 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Black Students	*Meet*	880	48.9	-0.04	26.7	1.18
	Not Meet	918	51.1			
	Total	1798				
White Students	*Meet*	3143	75.6	1.13		
	Not Meet	1012	24.4			
	Total	4155				
Grade 5 *(2000)*	**Level**	**N.**	**%**	**Log-Odds** *Ratio*	**Difference** %	**Difference** *Log-Odds*
Black Students	*Meet*	889	49.4	-0.02	31.6	1.48
	Not Meet	909	50.6			
	Total	1798				
White Students	*Meet*	3368	81.1	1.45		
	Not Meet	787	18.9			
	Total	4155				
Grade 8 *(1998)*	**Level**	**N.**	**%**	**Log-Odds** *Ratio*	**Difference** %	**Difference** *Log-Odds*
Black Students	*Meet*	714	50.4	0.02	28.1	1.28
	Not Meet	703	49.6			
	Total	1417				
White Students	*Meet*	3043	78.5	1.29		
	Not Meet	835	21.5			
	Total	3878				
Grade 10 *(2000)*	**Level**	**N.**	**%**	**Log-Odds** *Ratio*	**Difference** %	**Difference** *Log-Odds*
Black Students	*Meet*	619	43.7	-0.25	29.0	1.23
	Not Meet	798	56.3			
	Total	1417				
White Students	*Meet*	2817	72.6	0.98		
	Not Meet	1061	27.4			
	Total	3878				

Table 11
Average Test Scores in Mathematics for Matched Sample by Racial/Ethnic Group

Matched Sample 1	NCE Score			Difference		Scale Score		Difference	
	N.	*Mean*	*S.D.*	*Mean*	*d*	*Mean*	*S.D.*	*Mean*	*d*
Grade 3 *(1998)*									
Black Students	1807	44.2	17.1	14.0	0.74	396.2	32.2	28.4	0.82
White Student	4167	58.2	19.5			424.6	35.9		
Grade 5 *(2000)*									
Black Students	1807	44.8	19.7	18.0	0.88	439.0	32.8	33.2	0.93
White Student	4167	62.8	20.8			472.2	36.9		
Gain Score									
Black Students		0.60		4.0		42.8		4.8	
White Student		4.60				47.6			

Matched Sample 2	NCE Score			Difference		Scale Score		Difference	
	N.	*Mean*	*S.D.*	*Mean*	*d*	*Mean*	*S.D.*	*Mean*	*d*
Grade 8 *(1998)*									
Black Students	1412	43.1	16.7	14.0	0.75	466.3	32.2	32.4	0.82
White Student	3858	57.1	19.3			498.7	41.7		
Grade 10 *(2000)*									
Black Students	1412	39.5	17.7	14.8	0.75	497.1	28.7	28.5	0.80
White Student	3858	54.3	20.3			525.5	37.8		
Gain Score									
Black Students		-3.60		0.8		30.8		-3.9	
White Student		-2.80				26.8			

Table 12
Percentage of Students Meeting the Standard in Mathematics by Racial/Ethnic Group

Grade 3 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Black Students	*Meet*	662	36.7	-0.55	33.2	1.39
	Not Meet	1143	63.3			
	Total	1805				
White Students	*Meet*	2911	69.9	0.84		
	Not Meet	1255	30.1			
	Total	4166				

Grade 5 *(2000)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Black Students	*Meet*	673	37.3	-0.52	38.6	1.67
	Not Meet	1132	62.7			
	Total	1805				
White Students	*Meet*	3163	75.9	1.15		
	Not Meet	1003	24.1			
	Total	4166				

Grade 8 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Black Students	*Meet*	275	19.5	-1.42	33.1	1.52
	Not Meet	1135	80.5			
	Total	1410				
White Students	*Meet*	2029	52.6	0.11		
	Not Meet	1825	47.4			
	Total	3854				

Grade 10 *(2000)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Black Students	*Meet*	219	15.5	-1.69	31.4	1.57
	Not Meet	1191	84.5			
	Total	1410				
White Students	*Meet*	1807	46.9	-0.12		
	Not Meet	2047	53.1			
	Total	3854				

Table 13a
Percentage of Students Meeting the Standard in Reading by Racial/Ethnic Group and Gender

Gender	Grade 3 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	399	43.4	-0.26	36.1	1.62
		Not Meet	520	56.6			
		Total	919				
	White Students	*Meet*	1644	79.5	1.36		
		Not Meet	423	20.5			
		Total	2067				
Male	*Black Students*	*Meet*	519	59.0	0.37	12.7	0.57
		Not Meet	360	41.0			
		Total	879				
	White Students	*Meet*	1499	71.8	0.93		
		Not Meet	589	28.2			
		Total	2088				

Gender	Grade 5 *(2000)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	416	45.3	-0.19	38.3	1.82
		Not Meet	503	54.7			
		Total	919				
	White Students	*Meet*	1728	83.6	1.63		
		Not Meet	339	16.4			
		Total	2067				
Male	*Black Students*	*Meet*	493	56.1	0.24	22.5	1.05
		Not Meet	386	43.9			
		Total	879				
	White Students	*Meet*	1640	78.5	1.30		
		Not Meet	448	21.5			
		Total	2088				

Table 13b
Percentage of Students Meeting the Standard in Reading by Racial/Ethnic Group and Gender

Gender	Grade 8 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	456	58.8	0.36	24.7	1.27
		Not Meet	319	41.2			
		Total	775				
	White Students	*Meet*	1618	83.5	1.62		
		Not Meet	319	16.5			
		Total	1937				
Male	*Black Students*	*Meet*	258	40.2	-0.40	33.2	1.41
		Not Meet	384	59.8			
		Total	642				
	White Students	*Meet*	1425	73.4	1.02		
		Not Meet	516	26.6			
		Total	1941				

Gender	Grade 10 *(2000)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	380	49.0	-0.04	27.8	1.24
		Not Meet	395	51.0			
		Total	775				
	White Students	*Meet*	1488	76.8	1.20		
		Not Meet	449	23.2			
		Total	1937				
Male	*Black Students*	*Meet*	239	37.2	-0.52	31.2	1.30
		Not Meet	403	62.8			
		Total	642				
	White Students	*Meet*	1329	68.5	0.78		
		Not Meet	612	31.5			
		Total	1941				

Table 14a
Percentage of Students Meeting the Standard in Mathematics by Racial/Ethnic Group and Gender

Gender	Grade 3 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	350	38.3	-0.48	29.7	1.23
		Not Meet	565	61.7			
		Total	915				
	White Students	*Meet*	1404	68.0	0.75		
		Not Meet	662	32.0			
		Total	2066				
Male	*Black Students*	*Meet*	312	35.1	-0.62	36.7	1.55
		Not Meet	578	64.9			
		Total	890				
	White Students	*Meet*	1507	71.8	0.93		
		Not Meet	593	28.2			
		Total	2100				

Gender	Grade 5 *(2000)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	350	38.3	-0.48	37.0	1.59
		Not Meet	565	61.7			
		Total	915				
	White Students	*Meet*	1554	75.2	1.11		
		Not Meet	512	24.8			
		Total	2066				
Male	*Black Students*	*Meet*	323	36.3	-0.56	40.3	1.75
		Not Meet	567	63.7			
		Total	890				
	White Students	*Meet*	1609	76.6	1.19		
		Not Meet	491	23.4			
		Total	2100				

Table 14b
Percentage of Students Meeting the Standard in Mathematics by Racial/Ethnic Group and Gender

Gender	Grade 8 *(1998)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	160	20.8	-1.34	28.4	1.30
		Not Meet	608	79.2			
		Total	768				
	White Students	*Meet*	948	49.2	-0.03		
		Not Meet	978	50.8			
		Total	1926				
Male	*Black Students*	*Meet*	115	17.9	-1.52	38.2	1.77
		Not Meet	527	82.1			
		Total	642				
	White Students	*Meet*	1081	56.1	0.24		
		Not Meet	847	43.9			
		Total	1928				

Gender	Grade 10 *(2000)*	Level	N.	%	Log-Odds Ratio	Difference %	Difference Log-Odds
Female	*Black Students*	*Meet*	125	16.3	-1.64	27.5	1.39
		Not Meet	643	83.7			
		Total	768				
	White Students	*Meet*	843	43.8	-0.25		
		Not Meet	1083	56.2			
		Total	1926				
Male	*Black Students*	*Meet*	94	14.6	-1.76	35.4	1.76
		Not Meet	548	85.4			
		Total	642				
	White Students	*Meet*	964	50.0	0.00		
		Not Meet	964	50.0			
		Total	1928				

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